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[☞ The agency of bees in the fertilization of blossoms has recently attracted much attention, and has been largely discussed particularly among bee-keepers. It is manifest that crude and erroneous views respecting it are prevalent even among people in other respects highly intelligent. With the design to aid in correcting some of these, we copy the following interesting article from a late number of that able and usefnl periodical, the *American Naturalist*, issued monthly at Salem (Mass.)—a publication deserving of efficient and liberal patronage from the lovers of natural science in all parts of the country]:

Agency of Insects in Fertilizing Plants.

BY W. J. BEAL.

Mr. Charles Darwin and other botanists have proved beyond a doubt, that some flowers, in which the pollen may easily gain access to the stigma of the same flower, are sterile unless fertilized by pollen borne from other flowers, while many are much more productive by a cross fertilization.

For information concerning the peculiar manner in which fertilization is effected in the Balsam, Wood-sorrell, Violets, Dicentra or Dielytra, Corydalis, Mitchella or Partridge-berry, Oldenlandia or Houstonia, Primrose, Barberry, Lysimachia or Loosestrife, Orchids, Dutchman's Pipe, and others; consult the observations recorded by Mr. J. T. Rothrock in the second number of the *Naturalist*, Mr. Darwin's work on the "Fertilization of Orchids," and seven articles by Dr. A. Gray in the *American Agriculturist*, beginning in May, 1866.

With the fact that insects are necessary to fertilize some plants, and the theory that all are improved by crossing, let us see how this is accomplished in plants which may not seem to require the aid of the wind or insects. Plants are very rarely found in which the pollen may not, occasionally at least, get to the stigma of another flower of the same, or an allied species. Then if the pollen is "prepotent" or most effective on stigmas when thus transferred, a cross is very sure to result, even though much pollen comes in contact with the stigma of the same flower. Dr. Gray, acquainted with the facts, and familiar with the structure of the Iris, saw that insects must be needed for the fertilization of this plant also, and without seeing the bees upon them, shrewdly pointed out the manner in which they must carry the pollen from one flower to another. We verified his theory by observations made two years ago, and found it to be true in the essential particulars.

Without giving a scientific description of the flower, it is enough for our present purpose to say, that the parts consist of three curved tubes, each just about large enough to admit a common honey-bee, being a trifle larger than a cell in her comb.

There is a showy crest, or attractive platform, projecting at the other end of each tube upon which the bee first alights. When going into the flower for the first time during the day, she is free from pollen. She brushes against a lid which hangs from above, not unlike an old-fashioned swinging door of a cat-hole, as sometimes seen about barns or corn-cribs. When farther in beyond the lid, she comes against the anther, which only discharges pollen on the side next to the bee's back. After getting what nectar she can at the lower end of the tube, she backs out again, pushing the trap door in the opposite direction. The outside of this door is the only part of the stigma upon which the pollen will produce any effect, so upon visiting the first tube no pollen adheres to the sensitive side of the stigma, although the bee leaves the place with her back well powdered. Calling at another tube, she dives in as before, this time dusting the outside of the lid with pollen which was brought from the tube first visited.

In the early part of June, I examined the common Blue Flag (*Iris versicolor* Linn.) at different times during the day, and always succeeded in seeing the bees at work while their heads and backs contained an abundance of pollen. In wilted flowers, and in some that

were fresh, I saw bees occasionally get in and out at the side of the tube, without touching the stigma at all. Sometimes they went in the tube as first described, and then slipped out at the side instead of backing out. Several went on top of the flower and tried to find other ways to get at the sweets below, but in every instance they failed, and soon left that position.

At the Botanical Garden, Cambridge, Mass., I noticed bees on several foreign species of Iris, in some of which, as *Iris pseudocarus* of Southern Europe, the tube is more nearly perfect, so that it is impossible for them to find a side entrance or egress.

The corolla of *Andromeda floribunda* Pursh, is nearly urn-shaped, hanging with the open end or entrance down. The ten long anthers open at the apex by two round holes, and each anther is supplied with two horizontal or reflexed awns on the outside next the corolla. Bees in abundance visit the flowers, thrusting their long tongue or proboscis against the awns or horns of the anther, as they reach in for nectar which is secreted farther on. By hitting the awns the anthers are disturbed, and the holes brought close against some part of the bee's probocis, which is well sprinkled over with pollen, as well as the other mouth parts hanging below the flower. Bees were examined, and found to have the parts mentioned covered with the four-grained pollen which is peculiar to a few plants.

I cannot see how pollen alights on the stigmas of this plant, for in falling out in the natural way it must pass by to the ground. But the insect puts the material in place every time as effectually as a mason can stick mortar on the ceiling of a room. The Blueberry (*Vaccinium*) is similar in structure to the *Andromeda*, except that the awns are wanting. Probably most flowers which droop or hang down are fertilized by insects. For otherwise, how can the pollen find the tip of stigma, when the style is suspended?

The mode of fertilization in the American Laurel (*Kalmia*) has already been well described in the *Naturalist*, but I may be excused for adding my testimony concerning this beautiful and interesting plant.

When the anthers are liberated from the pockets in the corolla, the stamens suddenly straighten and throw jets of pollen often for a foot or more, "acting," as Professor Gray used to say, "like the boy's pea-shooter."

Many times when the dew was on, I have seen the common honey-bee and other *Hymenoptera* about these flowers. When the bee alights on a flower, the style comes up between the legs where they join the body, or sometimes farther back against the abdomen.

In this position they turn around, as though they were balanced on a pivot, generally inserting the tongue outside of the filament, and, while doing this, pull the stamens with their legs toward the centre of the flower, releasing them and frequently receiving the shots of pollen on their own body. A single visit from an insect is sufficient to release all the anthers. By noon it was a difficult matter to find a flower which had not been visited in this way. Insects seem to be absolutely necessary for the perfect fertilization of *Kalmia angustifolia* and *K. latifolia*, for I tied small nets over some flower-clusters, (*corymbs*,) and found that when the bees were kept away, the flowers withered and fell off, most of the anthers still remaining in the pockets, and the filaments so decayed that their elasticity was entirely gone. The very few anthers thus liberated were probably brought out by the shaking of the bushes by the wind.

Considerable pollen was found stuck on the corollas by the nectar, which was uncommonly abundant, as no insects of much size were allowed to remove it. The wind might have carried some of this pollen to other flowers, or it might have dripped from those above to flowers below in drops of water, (there were two showers during these experiments); but I infer this was not the case in the examples mentioned, because the flowers, especially the stigmas, remained fresh much longer than those which were left exposed to the visits of insects.

The flowers of several Honeysuckles, of the Mustard Family, (*Cruciferæ*), of the Bladdernut (*Staphylea trifolia* L.) were noticed, and in each case the conclusion reached was, that the chances are better for cross fertilization than otherwise.

The long cylindrical, bell-shaped corollas of the Purple Foxglove (*Digitalis purpurea*) are much visited by bees. The flowers are mostly obliquely suspended, and in all thus situated, the stamens and style are close to the upper side of the corolla. The insects alight at the opening of the corolla, on the side opposite the stamens. This is generally the lower side as the flowers hang, then reaching above, they catch hold of the style and stamens, and crawl in with the back down, brushing the whole length of the underside of the body, first against the stigma, and farther on, against the anthers.

They seem unable to get into the flower without catching hold of the stamens, and it is often with considerable difficulty that they enter at all, for they are obliged to hold on to the edge with the hind legs until they can catch the stamens with their fore legs.

In the Evening Primrose (*Oenothera glauca* Michx., *Oe. Missouriensis* and *linearis* Michx.) the stigmas project beyond the anthers, and the flowers vary from an erect to a horizontal position. There are four large stigmas for each style, spreading in the form of a Greek cross.

The pollen, slightly held together by delicate threads, is collected in the morning by great numbers of small wasps, about two-thirds the size of honey-bees. I have often watched them while coming down on, or just over, the stigmas, leaving pollen as they went in, and after collecting what they could, fly out at the side without touching the stigma. On one of these plants, at two different times, a wasp was eagerly trying to pick up the pollen which had been left on the stigmas; the more they tried to collect, the more they scattered pollen about on the glutinous surface, until, as if discouraged or disgusted, they rapidly cleaned their legs of all the tangled mass, and flew away, leaving that cluster of flowers entirely.

In the flowers of the Pea, False Indigo, Yellow-wood, (*Cladatris*,) Red-bud or Judas-tree, Red and White Clover, Locust, and others of this large and important family, (*Leguminosæ*,) anthers surround the stigma, and are closely covered by the corolla. This certainly looks like a very clear case of self-fertilization, but I doubt not the reverse is very often the case. Many of the flowers as the Pea and Locust, have one petal much larger than the rest, called the standard banner. Opposite this is another part composed of two petals sometimes united, termed the keel. On this keel bees uniformly alight, and crowd the head down next to the banner-petal. To enable them to do this, they kick the keel and side petals (wings) with their hind legs, and push them back so that the anthers and stigmas come out from their concealment and meet the underside of the insect where pollen may be left or received. Wny the style should be uniformly curved upward, and all should be brought against the abdomen of insects, I cannot well conceive, unless it be of some use to the plant.

Lupine, another species in this family, has a remarkably long keel which makes a close sheath for the inside parts. On the style, just below the extremity, is a circle of long stiff bristles. As the keel is pushed down, only the stigma, with the bristles below, appears outside, and this pushes out a mass of pollen which generally hits some part of the insect. When left, the flower resumes its former position again.

For about six times pollen can be pushed out in this way, when the supply becomes exhausted. Insects begin on the lowest flowers, and so go up the spike to others which are higher and younger. No experiments have been made on Lupine to show whether it will produce more seeds when visited by insects than when protected.

BEE-KEEPING and bee management are in common with agriculture and the proper treatment of soils, yet in their infancy. But the time is probably not far distant when hundreds of colonies will be kept on improved systems in many districts where dozens of them cannot at present be found.

IT IS conceded that those localities which are suited to the cultivation of white clover and buckwheat, are also suited to the production of honey, and that where a poppy will prosper, a bee will prosper also: consequently there are few situations where bee-keeping might not be successfully prosecuted.

IN ALL plans and operations with bees, the laws of nature should be attentively observed and assisted, by which much may be experienced and acquired from attention and perseverance, and the results aimed at attained at less trouble and expense than if an opposite course be pursued.

BEES usually work more from eight o'clock in the morning till noon, than during the rest of the day.

For the American Bee Journal.

Experience of a Novice in Bee-Keeping—No. 5.

I had read and re-read the instructions on Italian queen raising until I almost considered myself an expert in the business before trying it, and was impatient for the season to arrive to try my hand. About the 1st of April, I commenced by removing the best frames of brood from my Italians, who were yet far from strong, although healthy and doing well. The frame was put in my observatory hive so that we could inspect operations, and we were much gratified to find several queen cells had been started the next morning. As the weather was bad it became necessary to feed them, and all went on well until about a week after, when I forgot them so far as to let them get out of honey, so much so that they were mostly on the bottom board. The cells had been torn open and the brood sucked dry even to the queen cells.

I fed them a little honey at first to observe the effect, and observed that as soon as one got a taste he hurried to his suffering companions, giving each one a little, who, in his turn, performed the same office, until all became lively again, and then such a rejoicing and whirling about. I doubt if human beings rescued from starvation could have expressed more joy at the sight of plenty of food than did my bees.

This lot of queen cells were given up, and so they had a piece of first brood comb inserted.

This time we did not let them starve, but somehow their queen cell (they started but one) produced, after about 18 days, only a dead bee, having something in the shape of a queen, but only the size and appearance of a worker.

Another trial produced a similar result. I was considerably discouraged then, as far as early queen was concerned, and could not account for it, but now suppose it was owing to the small number of bees, as they had thinned down considerably, and the weather was so bad they perhaps could not get a sufficient supply of the proper food to furnish the royal jelly.

To make a sure thing of it next time, as it had got to be about the 25th of May, I removed my Italian queen from her hive and introduced her to another. In ten days I had eleven queen cells, and was much puzzled as to what I should do with them.

To get a very strong nucleus, I removed two frames each from each of my old hives, six in all, and put them into empty ones, looking them over carefully to avoid getting the old queens, as the books directed. But I was so bewildered by having to open so many strong hives, that I probably could not have seen them if they had half of them been queens. After having had six queen cells destroyed as fast as I inserted them, I finally discovered that I had removed the black queens from three of the six hives. I was advised to return them, but I thought as it was so much trouble to find them I would keep them out, and give them Italian queens when they became fertile; which operation took so long

that I very seriously injured the said hives for the season.

For some reason or other I have never succeeded in getting my queens fertile until from ten to fifteen days, generally when they are about twelve days old, quite different from the time given by most writers on the subject.

In following the advice of an author to Italianize all old stocks before swarming, I did not get ready to make my swarms until nearly August, and, as the season was very poor here, my my first year's bee-keeping was not very profitable, that is in dollars and cents. If experience is worth anything I did well, as I spent almost the whole summer and then had to buy a hundred pounds of coffee sugar for my swarms, besides using all my surplus, and doubling them up so that I had only four swarms from eight hives.

Perhaps a few facts may be interesting in my queen raising:

One of the black queens, after being in the nucleus hive two days, was given to a friend who wished to start an observatory hive.

Some bees were taken from one of his hives and were put into his glass hive, and the queen introduced. Several days after, on going to the nucleus hive from which she was taken, I discovered that it contained two clusters of bees; one at the front of the hive and one at the back. As they had an Italian queen a few days old I could not account for it, until the friend in question came to say that his glass hive was deserted. Another person saw them come over direct to that hive.

Now who can explain this for us. This queen had been taken from a swarm that I purchased about Chrismass over three miles from here; had never been out of her hive until I carried her over there in the cage, and *not a bee with her.* She had only been in the nucleus two days. Did she take the location when I picked her out with my fingers, or do queens possess the power, like cats and pigs are said to, of going home even when carried miles away in a cheese box?

Again, it is said by many, that a queen does not lead out a swarm. She must have done so in that case, as she brought all my friend's bees along, and picked out the nucleus she came from from the midst of a dozen others.

Again, at one time I had two queen cells so close together that I could not separate them, so I watched until one hatched and removed the other to a new nucleus, which queen, nearly as soon as hatched, returned with all the bees to the one I cut the cell from. This it seems *must* have been an accident, as I carried no bees from there at all. Still they were both at the extreme end of my apiary, and flew over several other similar ones in going to that one.

My experience with buckwheat are as follows:

I bought six late swarms of a neighor and carried them and set them in a buckwheat field in full bloom. They had plenty of comb and bees but no honey, and after leaving them there three weeks, while the buckwheat was alive with them, they did not improve a single pound. Several bee-keepers about here give the same result, and say they have never known buckwheat to produce any honey at all, although the bees seem very busy on it all the time it is in bloom.

One more piece of my experience and I have done for the time:

I gave $10 for a box hive in June last just as they had commenced in the boxes. I carried them home safely, and, as it was but a short distance, I thought I would keep them shut up for a day or two.

I fastened a piece of wire cloth over the entrance which was about two inches long by one-half wide, and also raised the drawers so as to let air in at the top. In the afternoon I noticed they were very densely packed about the entrance; they were put in the shade, and toward night I saw honey running out of the bottom. I then opened them, and found them almost scalding hot, and the combs and honey all melted down on to them.

I inferred that bees do need ventilation, and plenty of it, another correspondent to the contray. Of course all I had left for my $10 was strained honey and an empty hive.

A. J. ROOT.

MEDINA, OHIO.

[For the American Bee Journal.]

National Honey Plant.

ME LI LOT CLOVER.

(1.) Will it pay to cultivate any plant expressly for honey? If so which plant is best?

(2.) How many acres will keep 100 colonies busy while in bloom?

(3.) How many days in average seasons, and how long each day does it yield honey?

(4.) What soils are best adapted to its growth?

(5.) Is it an annual or a perennial? (*See Bee Journal, Vol.* 2 *Page* 165.)

No one has answered these inquiries, so I will try to do so—and in the order given.

(1.) There is one plant, at least, that it will pay to raise expressly for honey. The name of this plant is Melilot Clover (*Melilotus Leucantha.*) I have been well acquainted with the plant for several years, and am making preparations to raise several acres of it.

(2.) Ten acres will be enough to keep 100 families of bees at work while it is in blossom.

(3.) It blossoms and yields both honey and pollen through July, August, September, October and November. With us, last year, it was in bloom in December—after the first fall of snow. It is in full bloom during November, but the season is so cool in this latitude that bees can work but little upon it. In southern latitudes the plant is in blossom for a longer period. I am credibly informed that it will blossom in some of the Southern States during every month of the year. The plant is not materially effected by *drouths or frosts.* It grows very rank and shades the ground completely. This in connection with the great length of the *tap root*, is the cause of drouth not affecting it. Early frosts do not usually kill the blossoms;

but when thus destroyed it is again in full bloom in the course of a few days. Bees work upon the blossoms from morning until night, which is not the case with white clover, buckwheat, basswood or any other blossoms that I am acquainted with. In the middle of the day even bees do not suspend their labors, as the interior blossoms are so shaded and protected that the honey is not lost by evaporation.

(4.) This plant will grow on almost any soil, and without cultivation after it is once established. It will also grow in the shade of trees, hedges, or anything else; but it succeeds best on moderately dry soils, and those of a loamy, sandy, or gravelly nature. That is, it yields more *honey* on those soils.

(5.) It is a biennial plant, and hence easily destroyed, if desired. If it goes to seed, and the seed is not disturbed, it will give a new crop from year to year.

I have some seed of this plant and will send a small package of it to any of the JOURNAL readers, if two or three stamps are enclosed to pay for postage and trouble of putting up.

M. M. BALDRIDGE.

ST. CHARLES, ILLINOIS.

[For the American Bee Journal.]

Two or More Queens in a Hive.

I am sometimes led to wonder at the seeming surprise manifested by some on finding two or more queens in a hive, as if such was contrary to the nature and habits of the bees, or difficult to explain. Now while it is true to the nature of a queen to destroy her rival, yet it is also true to the nature of the workers to guard against such a destruction until they (the ruling power, if I may so speak,) shall decide what is for their interest. It is by no means an uncommon thing at swarming season, to find two or more queens in a hive—I have even taken five from a hive at one time. But why did they not destroy each other? Simply because the workers would not allow them to do so. The condition of the hive was as follows: The stock had cast a first or prime swarm, about the time the second swarm should have issued; bad weather came on, and as several queens were perfected about the same time, of course they would hatch about the same time, and as the workers desired to cast another swarm, each queen was guarded by its own cluster or guard, until fine weather should appear. Each queen and cluster forming as it were a distinct swarm. If fine weather had come soon enough, say within a day or two, the result would have been that the hive would have cast a second swarm, in which there would have been three or four queens. Or, more correctly speaking, there would have been a second, third, fourth and fifth swarm, all coming off together, and forming one of those swarms which ignorant beekeepers cannot account for, because in hiving it, they find two or more queens. The fact is, it is several swarms or clusters with their queens joined together, each cluster guarding its queen. But suppose foul weather had continued for some time. In that case, the workers would have given up the idea of swarming, the queens would have been released, and a royal battle would have been the result—only one queen surviving the deadly strife. In the case related by Mrs. Ellen S. Tupper, of Iowa, in BEE JOURNAL Vol. II, No. 12, the young queen was simply guarded by a portion of the workers loth to lose their queen; and had pleasant weather continued, one of the queens might have swarmed out, or crawled out of the hive as I have often seen them do. I cannot accept the inference drawn by Mrs. T., for it is not true to their nature that the workers should not distinguish her majesty, because she was unimpregnated. Although they do not pay that attention to an unfertilized queen that they do to a fertilized one, still every day facts prove that they readily understand that they are destined to propagate their species. Moreover if the workers had not distinguished her, the old queen certainly would, and would have killed her if she had not been guarded. I once assisted my brother to run three swarms into a hive containing empty combs; each swarm had a queen; the result was in this case, that each queen was guarded in separate parts of the hive and although all three were laying queens, still for two days, not a queen was allowed by the workers to move on the combs and lay, as not an egg was deposited in the cells. On the third day, the hive was again examined; one queen with a cluster of bees had crawled out to the outside of the hive; another queen with her guard, was lodged on the top of the comb frames, in the passage to the honey box; and the third queen was guarded in the hive, on one of the combs. Two of the queens were removed, and the next day, there were plenty of eggs in the combs. Each swarm was unwilling to yield up its queen to death. It is contrary to the nature of a queen to allow a rival queen in the hive; but it is not contrary to the nature of the workers to allow two or more queens in a hive for a time; and as the workers rule, the queens must abide their will. J. H. THOMAS.

BROOKLIN, C. W.

THE Abaza (a Circassian Tribe) have a strange way of burying their beys They put the body in a coffin of wood, which they nail on the branches of some high trees, and make a hole in the coffin by the head, that the beys, as they say, may look into heaven. Bees enter the coffin, and make honey, and cover the body with their comb. When the season comes, they open the coffin, take out the honey and sell it. Therefore much caution is necessary in buying and using the honey of the Abazas.

EVLIA EFFENDI.

WAX is bleached by re-melting it, and running it several times into thin sheets or cakes-suffering it to cool, and exposing it to the influence of the air and sun. This will render wax perfectly white.

WEIGHT OF BEES.—In one pound avordupois, or sixteen ounces, there are about five thousand bees. From fifteen to twenty thousand bees constitute a strong hive, that is, from *four* to *five* pounds in weight.

[From the Bienenzeitung.]

A Well-Ventilated Hive.

[The following novel experiment will furnish matter for reflection and study to bee-keepers who believe that, in the construction of hives, perfection has not yet been attained. It may be true that, in northern climates, the plan could not be made serviceable, even temporarily, for any purpose. But observation has satisfied us that in the middle States bees would work and prosper in the air, during the summer months at least, with no better accommodation or more protection than Major de Hruschka gave to his weak second swarm. It may, therefore, be possible to turn the fact to account, particularly in the Southern States, when the idea comes to be "worked up" by some inventive genius]:

The successful issue of some of my former essays have encouraged me to make further efforts in various directions, in the hope of ultimately advancing practical bee-culture. Among several experiments not yet fully carried out, there is one of which I feel impelled to communicate an account, trusting that some inquiring apiarian, favorably situated, will thus be induced to take up the matter, repeat what I have done, and aid in rendering available any ideas that may be suggested or new facts that may be developed. This experiment will probably be the more generally interesting as it involves the question which has engaged the attention and study of bee-keepers for ages—the hive and home of the honey bee.

On the 15th of May, 1866, I put in train of execution a long cherished idea. I desired to observe the whole career and final fate of a colony of bees to which, by way of novelty and variety, no habitation had been assigned. Whilst a large second swarm was clustered in my garden, an apparatus was hastily constructed, designed to support the combs that would be built, securing moveableness at the same time, and leaving the bees entirely unconfined on every side. This was accomplished by placing nine bars, or slats, of the usual length, though somewhat thicker, on a crossbar fastened on the top of a strong staff. Strips of comb guides were cemented to the lower side of the bars; and if the combs and slats were subsequestly attached to the cross-bars by the bees, the attachments could readily be severed with a knife, and comb after comb could then be easily removed if desired.

This skeleton fixture was then gently and slowly pushed into the clustered swarm from below; and before evening the bees had so completely taken possession of their airy habitation, that I could carry it to my yard and fix it there by inserting the pole in the ground at a suitable spot where it was accessible from every side. Next morning, satisfied that the bees were disposed to remain, as they had already begun to work, a wax-cloth roof was placed over them, about ten inches above the cluster, to shield it from rain and the direct rays of the sun. Thus, exposed to the elements and to whatever might choose to assail it, it was left to its fate on the belief that, sooner or later, its destruction was inevitable. Meanwhile combs were built very rapidly, and, in proportion to their numbers, the bees were exceedingly active. On the evening of the third day I could already see the edges of the snow-white combs protruding from the cluster. In due course of time the population began to increase, and in July it had eight combs of brood, each ten inches long by eight inches broad.

I was now unavoidably absent from home several months, and though thus totally uncared for and neglected, my little colony weathered the season admirably. On my return in October I found it still vigorous and working industriously.

The original intention was that the colony should be literally sacrificed for the sake of experiment, and it was therefore allowed to remain in its assigned location till autumn was already well advanced. But on finding it covered with hoar frost several mornings in succession, and perceiving that the bees on the periphery of the mass, were regularly dropping from the effects of cold and could not be revived, I removed it to a chamber in the northern side of my house, on the 5th of November, and there again suspended it as before. The temperature of the room could be kept at from 40° to 42° without fire during the winter. The windows and shutters were kept constantly closed. I allowed them to remain there undisturbed, even when, during six days in January, the outdoor temperature was at from 66° to 68°, and the bees of my apiary in the garden were flying briskly and gathering pollen. Hitherto few bees have died, nor has the colony apparently been in want of anything.

The observations made during the progress of this experiment thus far, though unavoidably interrupted for several months, were these:

1. The combs remained beautifully white for a much longer period than they do in close hives, even when brood has been repeatedly reared in them.

2. On the other hand the bees themselves grew perceptibly greyer and darker, even in midsummer. Among the later bred bees no variation in color was observable.

3. Though their flight was unobstructed in all directions, and the small roof afforded equal protection on every side, shading it alike all round at noon, the bees departed and returned almost exclusively on the south side—the combs running in parallel ranges north and south. The south side was ever the scene of greatest activity. On the other sides the bees were for the most part inactive, and I never saw them clustered there in festoons, as though elaborating wax.

4. The colony never suffered in the least, and was never annoyed by attacks from the bees of my other thirty-six hives, nor from moths, nor from *Cetonia opaca*, the most obtrusive and destructive enemy of bees in southern Europe; nor from *Sphinx atropos*, &c. This carefully noted fact can be accounted for from the entire

absence of those attractive odors which are constantly issuing from the mouths of common hives. Whatever odor was here generated became instantly dissipated. The insects, moreover, found no inviting cracks or crevices here, into which they might instinctively seek to enter for oviposition or metamorphosis.

5. It was evident beyond all question that, during the prevalence of excessively hot weather, this colony was more comfortable and in better condition, every way, than any other in my apiary. When, in summer, the thermometer at noon was at from 90° to 100° F. in the shade, labor ceased in common hives, and the bees hung out idly in masses, only a small number of individuals remaining within to attend to the brood. But the bees of this well-ventilated colony, meanwhile, appeared to be just in their true element, working with energy, exhibiting none of that irritation which characterizes others at such times, and having no crowds of loiterers "hanging round."

6. At this colony there were neither fanners nor wagglers to be seen at any time; no bees carrying off dross or droppings, none bringing in propolis or engaged in applying that substance. Of course there was a corresponding saving of muscular energy and time to be devoted to more profitable labor.

7. Since the colony was placed in winter quarters, the bees are congregated in the passages between five or six ranges of combs. They are ranged in ray-form with singular regularity, pair by pair *dos à dos*, with their heads turned inward toward the centre of the general cluster, and remaining perfectly quiet when undisturbed. There is never any condensation of moisture perceptible, nor any manifestation of discomfort or unrest. They obviously do not, as yet, suffer from the want of water, and certainly not from the want of ventilation.

8. This skeleton hive, as I have it arranged, is peculiarly adapted for investigating obscure or doubtful points in the internal economy of bees. The entire population and every part of every comb may at any time be subjected to scrutiny, and every suitable occasion may readily be availed of to prosecute researches for the elucidation of facts or the demonstration of theory. Thus I was able to ascertain that, during the winter, while the entire mass seemed to remain in perfect repose, there was all the while a regular slow movement in progress, by which the bees were regularly transferred from the periphery of the cluster to the centre and the converse—illustrating the

> "Constant rotation of the unwearied wheel,
> That Nature rides upon."

I shall endeavor next spring to place this colony in a swarming condition, and anticipate many pleasant hours in watching the preparations which the bees will make for that interesting event.

9. I must not omit to state how these bees deported themselves during several severe storms to which they were exposed, and we had some last summer of such violence as to threaten the existence of the little household. One of these, on its approach, struck the western side of the colony. For their protection, a great portion of the bees had clustered there in a mass of four-fold density, so that only the tips of their wings were seen protruding like scales, and thus forming an impenatrable cover to shed the rain. The remainder of the population remained in comparative security, close packed between the combs under shelter of the roof. The second storm was more violent and destructive, uprooting trees, unroofing buildings, and doing great damage in all directions. When I hastened to the rescue of my colony, I found that the rain had been blown in horizontally, and the bees so thoroughly drenched that they could be scarcely recognized. In other respects all was still in order, and next morning no traces of the occurrence were visible; not even the brood had sustained injury. The storm had been accompanied with hail, but as this happened to fall vertically the roof sufficed to ward it off.

The practicability of preserving, at least in this climate, so small a colony thus circumstanced, having thus been demonstrated, I shall repeat the experiment next spring on a larger scale, with a view to observe the deportment of the bees more minutely during the summer months. I shall place several strong colonies thus arranged in a covered area, in which they may likewise be wintered. Bees remain quiet at a temperature of 42° or 43° F.; a temperature of 47° or 48° renders them restless.

From what I have observed, I conceive that some practical advantages may be derived here from adopting this substitute for a hive. With us swarms, and even virgin swarms, are of frequent occurrence every year, and I shall seek to provide for these in this manner, with a view of disposing of them otherwise in the fall. *Wintering* bees in this manner, though entirely compatible with their own comfort, would not, I fancy, be conducive to the pecuniary interest of their owner, in consequence probably of the increased consumption of honey. Still, as the colony I experimented with was a small one, it would scarcely be fair to draw inferences from the quantity of stores it consumed, and the yield of honey was, moreover, not large in this region last summer.

F. De Hruschka.

Dolo, near Venice, Feb. 12, 1867.

[For the American Bee Journal.]

It has been said by some of our best writers on the honey bee, that in swarming season, to put up poles (in front of the stand) with a bunch of dry mullein stocks on each, the size of a swarm of bees, that young swarms would nearly always light on the stocks, and it would be much easier to hive them in this way.

Now, I think I have fully tested it this season, and I could not get one in ten to light on them. The only way that I could induce the bees to light on them was, when they commenced to light on a bush, to carry the mullein stocks close to them, and then a part would light on the stocks.

H. W. Cheasy.

Light Street, July 11, 1867.

For the American Bee Journal.

A Reply to Questions Propounded by Querist.

NO. 1—STRAIGHT COMBS.

It *is not* true in practice that elevating the Langstroth hive will "*always*" cause the bees to build combs straight and within the frames, though they will build much straighter when elevated than when not. "*Always* straight" has never been and never will be true in practice in any hive, except guide-frames are used; and in my practice guide-frames as a remedy are worse than the disease. It is well remarked by Elisha Gallup, on page 219 of the BEE JOURNAL, volume ii, that if the top bars of comb-frames are bevelled to the shape of a V, or, in other words, wedge-shaped, it is all the comb-guides that Querist will want. I only speak for one when I say the reason why I discard guide-frames is that in a properly constructed hive they are worse than useless. I have no trouble with crooked combs, or bees building across the frames. There are many that understand if a Langstroth hive is elevated that the combs are in much better shape, and the bees are not so likely to build across the frames. But none with whom I have conversed seem to understand *why* it is so. What is the reason? Simply because elevating the hive has the same effect as shortening the top piece of the frames. The shorter the frame, or the narrower the hive from front to rear, the straighter the combs. It will be observed that in a Langstroth hive when the frames are level the bees generally commence at three, and frequently four different points along the top piece of the frame to build their combs. The more points they commence at the more likely to build crooked and across the frames. In a frame with a top piece only twelve inches long, bees will seldom commence at over two points, and frequently only one, to build their combs, which lessens greatly the liability to build crooked. As already remarked, elevating the hive has the same effect as shortening the top piece of the frame, as it lessens the level or horizontal portion of the hive. Any person wishing to prove it, may shorten the frames of several Langstroth hives to ten or twelve inches, and elevate the same number, and note the results.

NO. 2—DESTROYING BROOD.

I cannot see the advantage of destroying worker brood, or eggs of a native colony, to give place for an Italian progeny. An Italian queen being safely introduced into a native colony, the work is done—you virtually have an Italian stock, as the native bees in a few weeks at most will perish, and be replaced by an Italian progeny. Making haste to destroy the natives by destroying eggs and brood, is to depopulate the hive for a time and lose the labor of the natives, which if not so good is at least better than no labor. True, it is desirable to destroy native drone-brood, which I always do by shaving off the caps of the cells deep enough to disturb the larvæ—the workers will do the rest.

NO. 3—DIVIDING BEES.

A plan that works well in the hands of a novice, and does not require a search for the queen, is as follows: In the morning of a fine day, remove the stock which you wish to divide from the stand; subdue, by smoking and rapping on the hive, until the bees are filled with honey, which will be in ten or fifteen minutes. Now remove all the combs but two, shaking or winging off the bees carefully into the hive, and place the combs in a new hive in the centre, putting an empty frame on each side next to the walls of the hive, and set it on the stand where the old hive had stood. Now fill up the old hive with empty frames, putting the two cards of comb near the center, say one empty frame between them, and set on a new stand some distance from the old one, and leave it there until night, when they must be exchanged—the old hive placed on its stand and the new one on the new stand, and the work is done. The above is a simple statement of the movements to be made, presuming that a novice who does not feel disposed to search for a *queen* will not be disposed to enquire the *reason*. That he has two good stocks in the place of one is the end of his ambition.

NO. 4—RAISING QUEENS.

My experience has been that queens raised in full stocks were larger and longer, the bees building a larger and longer cell. Whether such queens are any better for breeding is a question, but that they are more majestic and better looking is a fact.

I cannot speak from experience as to whether bees can be made to raise a larger number of queens than they do, by simply removing the queen, and, therefore, will at present remain silent.

NO. 5.—BEE-PASTURAGE.

I do not believe it would pay to cultivate any plant *expressly* for honey. I consider bee-keeping profitable from the fact that bees gather from the bountiful flora of nature that which would otherwise run to waste. The profit from a crop taken from the ground which would be occupied by a plant *expressly* for honey, would be larger than the profit arising from the extra amount of honey obtained by planting expressly for that purpose—the pasturage in many sections being already more than is required for the bees kept therein. Evidently, however, in other sections it would be profitable for the bee-keeper to plant that which, while it yields a profitable crop, at the same time adds to the lack of bee-pasturage in such sections. This, in my opinion, is not properly looked after.

J. H. THOMAS.

BROOKLIN, CANADA.

To stop bees from fighting and robbing one another, break the combs of the robbers, so that the honey will run down among them, and they will go to work at home. I had two hives of bees destroyed by being robbed, and should have had another robbed if I had not received the above information.

Bee Pasturage.

The benefits springing from bee-culture are so extensive and significant that the most strenuous efforts are being made at present not only to simplify its processes, but to bring into due acceptance and regard this interessing branch of rural economy. From the remotest antiquity honey and wax have been classed among articles of traffic and consumption, for mankind had learned to appreciate the value of the bee whilst it was still swarming in the wilds of nature uncontrolled. The industry and thrift of these insects early attracted the notice of the shrewd observer, who immediately strove to turn their labor to his own advantage, and thus laid the foundation of that art which has become widely diffused in every civilized land, and has of late years been brought to a high degree of perfection. Hence, in the present advanced state of the art, whatever may conduce practically to its wider extension, or contribute to more assured success, is interesting and important to those engaged in the pursuit. In this view the bee pasturage of the various districts of country deserves special attention and investigation, as the intelligent bee-keeper may largely promote the introduction and cultivation of honey-yielding crops and trees in his neighborhood, and also aid in preventing the useless eradication or destruction of wild plants furnishing like supplies. If in the spring the movemeut of the bees be carefully observed during their excursions, we shall find numerous varieties of flowers and blossoms which they delight in frequenting, from many of which they derive the most abundant supplies of nectar and pollen. Among these, as among the earliest, we may name the common currant and the gooseberry. These, cultivated on a large scale, in the vicinity of towns and cities, would yield remunerating crops of fruit, and furnish rich and unfailing pasturage for the bees, as their hardiness enables them to resist the influence of snows and frosts. There is hardly a yard or a garden in which currant and gooseberry bushes might not be introduced both for ornament and use. The cultivation of hazelnuts, peaches, apricots and cherries should be everywhere encouraged—of sour cherries especially, in the blossoms of which the bees seem to revel with intense enjoyment. Nearly all our common fruit trees yield honey in abundance when in bloom; though it has been observed for some years past that the bees are injuriously effected at times in some localities, by the blossoms of the apple tree, producing torpor and death. The cause of this is believed to be found in the myriads of aphides with which the blossoms are occasionally infested. Of the blossoms of the various kinds of birch the bees are exceedingly fond, and they are very rich inh oney. Maple trees of every variety yield pollen and honey in abundance, and large old trees are a perfect treasure, in this respect, in the neighborhood of an apiary. The red and the white beech, several species of the oak, and the horse-chestnut, are valuable for bees, though a prejudice prevails against the latter, in some sections, from an idea that its blossoms possess a noxious quality. Pine and fir trees yield honey, pollen, and propolis in profusion, but the honey is of inferior quality, and has been held in suspicion as the cause of foulbrood. The European laurel and yew yield honey likewise, but not so abundantly as the other overgreens; and the same may be said of the juniper. The common privet, an excellent hedge plant which might be used for screens in yards or gardens, is rich in nectar and continues long in bloom.

Winter rape, when cultivated for oil, is one of the most productive honey-yielding plants, and if the weather is favorable to the bees when a large rape field is in blossom, immense quantities of honey will be gathered and stored up by strong stocks. It is to be regretted that this crop is not sufficiently remunerative to induce extensive cultivation, as it comes into bloom after the fruit trees and previous to the lindens and white clover, thus filling up an interval when bees usually find little to gather. Mustard, both white and black, is a valuable crop for bees, and when extensively grown for seed, proves a great treat for the bees of the neighborhood. Charlock, though a noxious weed—a perfect pest to the former—has yet some redeeming qualities in the quantity of the honey it yields; and the same is true of the Canada and other thistles. We regret that this is all that can be said in their favor—insufficient, we know, to save them from universal execration.

Strawberries, raspberries, blackberries, dewberries, whortleberries—the entire catalogue of small fruits—when in bloom, are eagerly visited by the bees and yield them a long-continued feast. The honey from these plants is peculiarly fine, that of the raspberry especially being most delicious. Onions and leeks, when in bloom, are visited by bees, and are deemed medicinal by some ancient bee-keepers, who possibly had a predilection for high-flavored condiments. White clover yields honey profusely, and continues in bloom four or five weeks in ordinary seasons. Melilot is excellent though not so common. Esparcette is a highly valuable honey plant, but requires a limestone soil, and is not regarded as so good a forage crop as the common red clover, which unfortunately is of no account for bee pasturage. Luzerne grass yields considerable honey, but is not so extensively cultivated, except in the south of France. The Swedish clover, recently introduced, promises well as a forage plant in northern districts. It winters well, and yields honey as abundantly as the white clover, and of as good quality. It deserves a fair trial everywhere, and will no doubt become established where soil and climate are adapted to it. Beans, peas and vetches, rank only among the moderately productive honey plants, but may prove to be of no small importance in sections where they are regularly grown as field crops. Hemp is a favorite with bees, though seldom met with since cotton has supplanted sail duck and hanging has gone out of fashion. Flax, where grown for seed, is much frequented by bees while in bloom.

Among the wild plants and herbs are those cultivaied for medicinal and domestic purposes—dandelion, savory, pennyroyal, hoarhound,

mint, catnip, balm, celandine and marjorum—are all excellent, and where they abound add materially to the honey resources of the bee. Borage, goldenrod, and several varieties of the aster, yield plentiful supplies, of long continuance, late in the fall, some of the latter even surviving the earlier frosts. Many plants and flowers, besides those here cursorily enumerated, will the observant bee-keeper find frequented by the bees. He should carefully note them; encourage the introduction and cultivation of such as can be rendered useful in other respects also, and strive to prevent the destruction of such as, being regarded as weeds, are perhaps of no direct or known and positive economic value, but yet of benefit to the bee and in no wise injurious to the cultivator of the soil. When they do not occupy or encroach on cultivated ground, they should be permitted to grow.

In some seasons and sections honey-dew is of frequent occurrence, and bees eagerly collect it. For the subsistence of the bees it answers well enough, but as honey for table use it is of inferior quality and poor flavor. In dry seasons, especially in autumn when plants and flowers cease to supply nectar, wasps and hornets will attack ripening fruit, such as cherries, plums, apricots, peaches, pears and grapes, and the bees follow in their wake, appropriating the saccharine juices. Here the damage is really done by the first-named insects, and the bees simply gather up and preserve what would otherwise be lost.

☞ As the evidence of the purity of Italian bees are now being discussed in the BEE JOURNAL, and is a topic of much interest to those bee-keepers who contemplate introducing that race in their apiaries, we have deemed it proper to copy from the Albany "*Country Gentleman*" an article giving Mr. Quinby's views of the subject—the more so, as reference has been made to him by some of our correspondents. Our own convictions, as heretofore expressed, certainly differ widely from those of Mr. Q. In accordance with our observations and experience, docility may be regarded as the exception among black bees, whereas it is the rule among Italians. We have never yet seen pure stock, where the workers had not three orange colored bands fully displayed, were not strikingly docile under ordinary treatment when the hive was opened and combs lifted out, and did not tenaciously adhere to the combs when these were shaken. Of course they may be forcibly shaken off, and aroused to anger, but not by ordinary treatment, or even by such as would hardly fail to irritate black bees:

Docility of Italian Bees.

EDS. CO. GENT.: Ever since the first importation of Italian bees by Mahan and Parsons, some seven years ago, there bas been great solicitude on the part of many breeders lest some purchasers might get an impure article from his competing neighbor. Parsons suggested, in a card, that Mahan's was not the genuine. Mahan challenged a comparison, and brought specimens from Philadelphia to New York city. I was called two hundred miles to look on. Pasons refused to exhibit, and nothing was settled.

In reply to some remarks relative to the Italian bee "stinging furiously, R. C., of Baltimore, says: "I have not met with a single instance where queens were purely impregnated and produced irritable workers. This is so invariably the case, that I regard docility of temperament as one of the best and surest tests of purity."

I wish he had given the number of cases where he knew the queens were "purely impregnated." It may be half a dozen or five hundred. The latter number would *prove* the position much stronger than the first. It would also throw a little light on the suggestion that even hybrids are sometimes docile.

At one of our State Fairs, a bee and patent-hive vender was distributing "Circulars on Bee-keeping" to bee-keepers, free. While listening to him, I was interested in the same story of the quiet disposition of the Italians, and without being aware of my presence, he indulged in some entertaining remarks: "Quinby was reliable generally, but was mistaken here; he had said that his bees were cross, and they were, of course, hybrids. He could prove to Quinby, or any one else, that this was a test of purity; for that purpose he kept them in two yards, alike in appearance but different in disposition, &c." I suggested that if "extreme docility was proof sufficient of pure Italian origin, that the bees of Mr. Flanders, which he collected in his hat, in his hand, even in his mouth, with impunity, ought to be doubly and trebly refined Italian, and yet they were common bees." If it is said they were trained or charmed, how will it be proved that those of Mr. ——— were not trained also—I mean those that were kept for exhibition to prove purity. After ascertaining that Quinby had been a listener for sometime, he endeavored to conciliate by offering to send him a pure queen for the purpose of contrasting their qualities, &c. The queen has not yet arrived, consequently I am unable to report. Another, full of commisseration for me, as he had the pure ones, would send me one for a specimen. If I found her bees more docile than any I already had, I was to pay double price, if not, he was to charge me nothing. I replied to this by another proposition: "That he might furnish the queen, and I would let him know when her bees constituted the entire family, and he, or some one that he would designate, should visit my apiary; I would point out a few hives, one of which should contain his queen and her family; he should say which it was, judging by the disposition. If he failed, it would be evidence that mine were as pure as his own, and he should be entitled to nothing; if he designated his own, he was to have pay for his queen and all trouble." I have heard nothing furher from him. Can I not infer that he had not full confidence in his test? A person that never had any experience with black bees, further than with a few dozen box hives, can *know* but little of the difference

of disposition of bees in different yards, and of bees in the same yard at different times. Many who have endeavored to set up this standard, never yet knew how to manage the black bees properly, do not know how easily they may be subdued—have always worked with fear and trembling.

After all my experience, I encountered last year the worst tempered apiary of black bees I ever saw—bad as any hybrids. Had I no further experience than with this yard of 90 stocks, I should not have hesitated to call the black bees the worst. As it is, I know it to be the exception, not the rule. These bees had never been handled. Bees *properly* handled, at *proper* times, will greatly improve in disposition.

I presume that a great many who have reported in favor of the Italians, would reverse their decision if they would change their practice—manipulate the combs of their black bees thirty times to their Italians once. If docility of disposition is the only test, we may be satisfied some time with the entire black bees.

M. QUINBY.

ST. JOHNSVILLE, N, Y.

An Inquiry into the Source and Nature of Bees-wax.

Till within these few years it was very generally and implicitly believed, that the yellow matter (in other words, the pollen or farina of flowers,) which bees visibly collect on their thighs, is the prime constituent of wax, the material of the honey-comb. Even Swammerdam, Reaumur and Bonnet were of this opinion. Butler, Purchas, Rusden and Thorley argued against its identity with wax; and I trust that the observations and experiments which I am about to detail will convince the dispassionate inquirer of the fallacy of this old opinion.

In the first place, it is to be observed, that where no more comb can be built, as in old hives, the bees carry in the greatest quantity of this yellow matter.

Secondly, That it differs materially from wax, the latter when examined between the fingers being adhesive, the former crumbly; the latter also liquifying on the application of heat, whilst the former burns to ashes.

Thirdly, That the wax of new combs, from whatever source collected, is uniformly white; whereas, the farina, as gathered by the bees, varies in color, being generally yellow or red, agreeing in color with the anther dust of the flowers in blossom at the time of its collection. Moreover the farina, after it has been stored in the cells, retains its original color; whilst wax, after its residence in the hives, invariably changes, first to a yellow, and lastly to a dark brown. Layers of different-colored farina are generally found in the cells, if slit down; and every hive, at the season of deprivation, possesses a store of it.

Fourthly, That fresh colonies carry in very little, if any, of this matter, for some days after swarming, though combs are formed within that period. I noticed this fact in my first colony: the swarm issued from the parent hive on the 18th of May;—five days of rainy weather succeeded: during this period the bees were prevented from flying abroad; I fed them nightly with sugared ale, and before the return of fine weather a considerable quantity of comb was formed. Now excepting such materials as the bees might have brought with them from the parent hive, in this case, the sugared ale alone must have been the source of the wax. Huish has remarked that unless bees have access to water, and also to sugar or honey, no comb can be formed. Again it may be observed, that upon the storifying plan, when fresh works are commenced in the duplets or triplets, if the farina were the basis of the combs, an increased quantity should be carried in. On the contrary, though I have watched the bees very minutely on these occasions, I scarcely ever witnessed the introduction of farina; and in such rare instances as I did observe it, it might fairly be regarded as food for the young larvæ of the bees contained in the full box or boxes.

The observations of Mr. John Hunter tended to confirm this view of the matter; still more so, those of M. Huber and son. In order to determine the point with greater precision, Huber instituted many experiments. On the 24th of May he lodged a recent swarm in a straw hive, leaving at its disposal only a sufficiency of honey and water for its consumption, and preventing it from going beyond the precincts of a room, so closed as to admit only a renewal of the air.* At the end of five days as many cakes of beautifully white, though very fragile wax, were suspended from the roof; the honey had totally disappeared. Still, however, as there was a possibility that the thighs and stomachs of the bees might have conveyed pollen from the parent hive, he withdrew these five combs, and replaced the bees in the hive with a fresh supply of honey and water; they renewed their toil with unabated industry, and soon fabricated new combs: these last were taken from them; when the patient and indefatigable insects commenced a third structure of comb. Five times in succession were their works thus completed and removed, although during the whole of this period they were fed merely with honey and water, and could not possibly have had access to farina.

These experiments, so uniform in their results, give indubitable validity to the fact—that honey through the organic intervention of bees, may be converted into wax. A contrary experiment was made, by abundantly supplying a hive with fruit and pollen only: but during eight days confinement the bees produced no wax whatever, nor exhibited any plates under their abdominal rings: no combs were formed, nor was an atom of farina touched,—a clear proof that farina supplies neither wax nor sustenance to adult bees. The improbability of this indeed is evinced by its abundance in hives whose tenants have died of famine. And as to its being the constituent of wax, Reaumur calculated that a well stocked hive might collect at least 100 pounds of pollen in a season, whereas the weight of wax fabricated in the

* To prevent the bees from being impatient, it was found necessary to conduct the experiment in a cool place, as well as to exclude the light.

same time would not exceed two pounds.

Experiments have proved the excellence of sugar as a substitute for honey, and in some instances its superiority, for the formation of wax. It might otherwise have been supposed that bees might form comb from some particles of wax accidentally present in the honey, and that these afforded the pabulum for this secretion. To prove therefore that the saccharine principle alone enabled the bees to produce wax, being still confined, they were supplied with a syrup made with Canary-sugar and water, and at the same time comparative experiments were made in another hive, where the bees were fed on honey and water. The syrup-fed bees produced wax sooner and more abundantly than the honey-fed bees. Another fact was also incontrovertibly elicited; namely, that in the old hives the honey is warehoused, and that in the new ones it is consumed and transmuted into wax.

The experiments of Huber have been confirmed by those of M. Blondeln, of Noyau, who addressed a memoir upon this subject to the Society of Agriculture at Paris, in May 1812. Huish has critically examined these experiments of Huber, but without being convinced by them; for having observed pollen on the thighs of bees when swarming, and upon dissection, in their stomachs also, he considers that pollen, elaborated in the second stomach of the bee, "contains in itself the principle of wax." Were this the case what a store of pollen must the bees have reserved, in Huber's experiments, wherein they formed five successive sets of comb, without access to fresh pollen! The pollen or bee-bread, which Huish discovered on the thighs and in the stomach of some of his bees, was most likely imported by such of them as being on the return home at the time their companions were swarming, joined the throng with that freight which was intended for larva-food in the hive. With this pollen (or ambrosia, as it has been called), after conversion into a sort of whitish jelly by the action of the bee's stomach, where it is probably mixed with honey, and then regurgitated, the young brood, immediately upon their exclusion from the ova state and until their change into nymphs, are fed by the nursing-bees several times a day. The opinion that pollen is the prime constituent of wax was held by Buffon, and remains uncontradicted in an edition of his works so late as 1821. Arthur Dobbs, Esq., in the Philosophical Transactions for 1752, instead of considering wax as digested pollen discharged from the stomach of the bee, regards it as being emitted *per anum*; and as he speaks of its discharge in husks or shells, doubtless he saw it in that form, which it is now known to assume when moulded upon the body of the bee. Indeed he says that he has had swarming bees alight upon his hand, and drop warm wax upon it. Its being secreted only by the under side of the belly might easily deceive, and lead him to regard it as alvine excrement. That minute and accurate observer, Butler, though evidently not aware of the secretory process by which wax is generated, noticed that in fresh swarms, the bees came in without any pollen upon their thighs, and therefore supposed the mouth to be the vehicle for conveying it. "When they gather abundance of this stuff," (pollen) "they have never the more wax; when they make most wax, they gather none of this." Butler even remarked that old stocks gather much pollen, and fresh ones little; because the stocks have larva to feed, whilst the swarms have none.

I will here subjoin some more proofs of the nonidentity of wax and pollen. So long ago, as 1768, the LUSATIAN SOCIETY (called *Societè des Abeilles*, founded at little Bautzen, a village in Upper Lusatia, under the auspices of the Elector of Saxony,) knew that wax was not discharged from the mouths of bees, but was secreted in thin scales among their abdominal rings or segments. About 1774, Mr. Thorley caught a bee just entering its hive, and found, among the plaits of its belly, no less than six pieces or scales of solid wax, perfectly white and transparent, and he oftentimes saw wax in the same situation. M. Duchet, in his *Culture des Abeilles*, quoted by Wildman in 1778, declares that wax is formed of honey; and relates in proof of it, that he has seen a broken comb of an overset hive, which was repaired during bad weather, when the bees could not acquire any other material. This statement of Duchet corresponds with my own observation, as stated before, but is not so conclusive. In Duchet's instance there might have been other materials in the hive besides honey; whereas in my case the bees had access to no materials whatever, excepting the sugared ale and the honey which they had conveyed from the parent hive, the swarm having been just hived. Butler and Wildman state their having seen pieces of wax, like fish scales, on the hive floor of fresh swarmed colonies, part of which, at least, they both thought must have been formed upon the body of the bee; for though some flakes might have fallen from the combs then constructing, there were many pieces among them which were concave on one side and convex on the other, as if moulded on the insect's belly. Flakes were likewise seen, hanging loose, between the abdominal scales of the bees. In 1792, Mr. John Hunter, apparently unacquainted with antecedent conjectures, detected the genuine reservoir of wax under the bee's belly. He considered wax as an external secretion of oil, formed and moulded between the abdominal scales of the insect. Dr. Evans confirms the testimony of Wildman and Hunter. "One or more bees," he remarks, "may be often seen before the door of the hive, supporting themselves by their two fore feet, fluttering their wings, and agitating the hind parts of their bodies. They are then evidently moulding the wax between their abdominal scales, the motion of the wings serving to preserve their balance, and as a signal for their companions within to come and carry off the falling flakes, to the formation of which he was an eye-witness."

To complete the evidence, however, to me so irresistible, in favor of the wax-secreting faculty of the bee's body, I observe finally, that in 1793, M. Huber's observations led him to the same conclusion as Mr. Hunter's, relative to the

nature of the laminæ under the abdominal scales: but Huber slumbered not there; he prosecuted the inquiry more successfully than any preceding naturalist, and at length demonstrated the secreting organs which had eluded the scrutiny of Swammerdam, Hunter, and other acute anatomists. He found that these laminæ were contained in distinct receptacles, on each side of the middle process of the scales; he examined, with great care, the form and structure of these secreting cavities, which are peculiar to working bees. Each working bee has eight of these organs, sacklets or small compartments. Their general shape is an irregular pentagon, and the plates of wax, being moulded in them, exhibit accordingly the same form. A perforation of their lining membrane on the side next to the abdomen, started a jet of transparent fluid, which congealed on cooling; in this state, it resembled wax, and became again fluid on the application of heat.

Comparative experiments were made with the substance contained in the pouches and with the wax of fresh combs: a great similarity between these two substances was discerned; the latter appeared somewhat more compound, having probably received some additional ingredient, while employed as the material for building. The secreting function of the membrane on the inner surface of these cavities, was further evinced by a more minute examination of its structure, which exhibited a number of folds, forming an hexagonal network, analogous to the inner coat of the second stomach of ruminating quadrupeds. Huber does not appear to have known the observations either of Duchet or of Wildman on this subject, although they were made long prior to Mr. Hunter's; for he quotes only from the latter.

Whenever combs are wanted, bees fill their crops with honey, and retaining it in them, hang together in a cluster from the top of the hive, and remain apparently in a state of profound inactivity, about twenty-four hours. During this time, the wax is secreted, and may be seen in laminæ, under the abdominal scales, whence it is removed by the hind legs of the bee, and transferred to the fore legs; from them it is taken by the jaws, and after being masticated, the fabrication of comb commences. In swarms it may, and sometimes does, commence immediately after hiving, thus affording evidence of preparation, and consequently of intention to swarm.

"To see the wax-pockets in the hive bee, you must press the abdomen, so as to cause its distention; you will then find, on each of the four intermediate ventral segments, separated by the carina or elevated central part, two trapeziform whitish pockets, of a soft membranaceous texture; on these the laminæ of wax are formed, in different states, more or less perceptible."* Eight scales are thus produced at once, a pair under each ring, except the first and last, which are constituted differently from the rest. The size of the scale varies with the diameter of the rings, on which they are moulded; the largest being beneath the third, the smallest under the fifth ring.

* Kirby and Spence.

"Non labor omnibus idem," says Vaniere. Messrs. Huber and Son have affirmed that the office of collecting honey, for the elaboration of wax, is filled by a particular description of bees or laborers, to which they have given the name of *wax-workers*. These bees are susceptible of an increase in size, as is evident from the state of their stomachs, when quite full of honey. Dissection has shown that their stomachs are more capacious than those of the bees that are differently occupied. Bees not possessed of this expanding stomach, gather no more honey than is necessary to supply the immediate wants of themselves and their companions, with whom they readily share it: they seem formed for retirement, and are called *nursing-bees*, their duty being to rear the young, and attend to the internal economy of the hive. The task of storing with provisions devolves upon the wax-workers, who, when not occupied in the construction of comb, disgorge the honey into those cells which are intended for its reception: By marking the bees, it was found that they never encroached upon each other's employment; this strict adjustment of duty is the more remarkable, since the power of producing wax is common both to the nursing and wax-working bees, a small quantity of wax having been actually found in the receptacles of the nursing bees. The difference between these bees had probably been observed both by Aristotle and Pliny; the former speaks of "optimum genus apum, quæ breves, variæ et in rotunditatem compactiles; secundæ quæ longæ et vespis similes;" and Pliny uses similar language. That such difference actually exists, is confirmed by the observations of Mr. Newport on humble bees; he witnessed their mode of raising the temperature of their domicile some hours before the perfect maturation of the brood, and found there was a successive change of nurses, as soon as the heat of those in attendance became lowered by perspiration.

In the foregoing experiments for ascertaining the sources of wax, the bees had borne their confinement without evincing the least impatience; but on another occasion, when shut up with a brood of eggs and larvæ, and without pollen, though honey was copiously supplied, they manifested uneasiness and rage at their imprisonment. Fearing the consequence of this state of tumult being prolonged, Huber allowed them to escape in the evening, when too late to collect provisions; the bees soon returned home. At the end of five days, during which this experiment was tried, the hive was examined: the larvæ had perished, and the jelly that surrounded them on their introduction into the hive had disappeared. The same bees were then supplied with fresh brood, together with some comb containing pollen: very different indeed was their behavior with this outfit; they eagerly seized the pollen and conveyed it to the young; order and prosperity were re-established in the colony; the larvæ underwent the usual transformations; royal cells were completed and closed with wax, and the bees showed no desire to quit their habitation. These experiments afford indisputable evidence of the origin of wax, and the destination of pollen. Butler observed

that there was a great increase in the members of the hive after pollen was carried in, which he supposed rendered the queen prolific.

Though the wax of honey and brood-comb is an original secretion from the body of the bee, wax is also considered by some as a vegetable substance existing abundantly in nature. According to Proust, it forms the silvery down on the leaves, flowers and fruit of many plants, and resides likewise in the feculæ of others.

Dr. Darwin, in his *Phytologia*, supposes that wax is secreted to glaze over the fecundating dust of the anthers, and prevent its premature explosion from excessive moisture: to an unseasonable dispersion of anther-dust he ascribes the failure of orchard and corn crops in summers of extreme humidity. The wax-tree of Louisiana, *Myrica cerifera*, contains immense quantities of wax. In this respect there appears an identity betwixt animal and vegetable secretion, which may be viewed as indicative of simplicity in the structure of the bee; a still simpler organization exists in the aphis, which extracts the saccharine juices from the leaves and bark of trees, and expels them again nearly unchanged.

[For the American Bee Journal.]

Purity of Italian Queens.

Mr. Grimm, on page 228, June number of the BEE JOURNAL, doubts that there are Italian queens which produce young queen invariably duplicates of themselves. He says: "I cannot conceive why Mr. Kleine wrote the interesting letter referred to, nor why Mrs. Tupper defines the purity of Italian queens as she does, when both of them should have known that they had no such queens themselves, and could not procure such even in Italy." It seems strange to me that Mr. Grimm should doubt, in this way, a positive assertion of Mr. Kleine; nor can I conceive what has authorized him to judge of any one's queens except his own. If he has as he says, reared "over six hundred queens" in a short time, from *three* mothers, in a section of country abounding in black bees, it will not surprise any one who has been engaged in the business that he should produce "queens that vary greatly in color;" nor is it fair that the queens he reared, under such circumstances, should be taken as specimens and compared with those reared by Mr. Kleine, Mr. Langstroth, and others, who have spent thrice as many years in rearing half that number from the choicest stock, destroying every queen that did not produce good progeny.

It is quite as unfair to express an opinion of my queens, because he once saw the outside of my hives on a damp autumn day, when not a young bee was in flight, and he did not open a hive or see a queen. He entirely misinterprets the remark made by me to him at Burlington, which was to this eflect: "That those who purchased queens from some dealers in them were obliged to be satisfied if they obtained a majority of young queens from them like the parent." He does not repeat what I distinctly asserted, and what is now, from this season's experience, even more firmly my belief, that if we would have and keep the Italian bee pure, we must rear from no queens that do not reproduce themselves. You may call their color brown, or yellow, or leather color, or what you please, but, with slight variations of shade from dark to light, an Italian queen purely impregneted will produce young queens *like herself*. If she does not, however valuable she may be for the purpose of building up a colony, or how energetic that colony may be, she should not be used to *rear other queens from*.

Mr. Grimm's method of multiplying stocks rapidly, and preserving all queens, whatever their marking, even to the number of six hundred from three in as many years, may be the most profitable, since no one disputes that for honey-storing purposes, or rapidity of increase, bees not perfectly pure are quite as valuable as the best. We only protest against his comparing queens reared in this manner with those of others who proceed in quite a different way. In this matter, I would express my great obligations to Richard Colvin, Esq., of Baltimore. After several disappointments in queens, I sent to him four years ago and received from him two Italian queens, from an importation of his own. They were introduced into good colonies late in the fall, and early the succeeding spring I commenced rearing from them. Out of forty reared from one of them, every one was *like herself* in coloring, (call that color what you please.) From the other several were differently marked, not like black bees, but with distinct yellow wings, and, though large and handsome, totally unlike the parent. (I can hardly describe their appearance, but all who rear queens will understand me.) I wrote to Mr. Colvin and "reported progress." He replied immediately, advising me to "rear no more from the latter queen, and to destroy all I had reared, for nothing from such a queen would be pure, except her drones." He soon replaced her by another, which, like the first, did always duplicate herself.

I have since then purchased eight queens of different importations, and but one of them all has, like Mr. Colvin's, given me invariably well marked queens. Still I have kept his advice in view, and never reared from any one (after testing her) that gave me any poorly marked queens. I have queens in the third generation from all that produced pure, and find that, when they are fertilized by Italian drones, their queen progeny is just the same as were the original; and that the workers from them not only are uniformly marked, but gentle, not disposed to sting, and that they cling with tenacity to a comb when lifted out, so that it is almost impossible to dislodge them. Some say that this peculiarity is a better test than any markings. In my experience, when they are properly marked, they always possess this peculiarity. I have never seen pure Italian bees without it.

At first, as I expected, a very large proportion of my young queens met common drones. These I kept for honey-storing purposes exclusively, replacing them as fast as pos-

sible, and allowing no natural swarming when it could be avoided, that I might keep track of every queen. I found, too, that many of my young queens produced much finer drones than their mothers. My proportion of queens properly fertilized, has been fast increasing; and last fall, out of forty-six reared in October, all but two met Italian drones. This spring, instead of being obliged to rear from three queens, I have had over thirty that did not fail to give me duplicates of themselves; and, though I do not claim to be free from much hybrid stock, nor expect to rear "six hundred pure queens" in —— years, I do know that by taking sufficient pains any one may have Italian queens that will produce workers uniformly marked with three rings, gentle and "tenacious" in disposition, and that will produce queens always like themselves in coloring. As to drones, though there is undoubtedly more difference in their coloring than in that of workers and queens, I find that, by selecting queens that produce the best colored drones to rear from, there may be a great improvement in this respect also. ELLEN S. TUPPER.

BRIGHTON, IOWA, July 5, 1867.

[Translated for the Bee Journal.

Do Bees Know Their Owner?

Every one who had the good fortune to spend the years of his boyhood and youth in intimate communion with external nature, whether bred among quiet rural scenes, or visiting them only occasionally to escape from the dust and noise of city life, recalls with delight the hum of the busy bee and the home-like snugness of the old fashioned straw hive. Our remembrance of the honey-gathering insect is connected with sweet passages of pastoral poetry, with the shrewd admonitions of "proverbial philosophy," and the wise teachings of the "Poor Richards" of an earlier day. We summon to the mind's eye the stalwart form of the aged bee-keeper, arrayed in tasselled cap, stout gray blouse, black breeches, blue hose and buckskin slippers, seated in a snug shady corner of his garden; and, while regarding him with reverence and awe as the captain bold of hosts multitudinous and fierce, cast a timid glance at his picturesque apiary—the armory of the "small infantry" of which he is comptroller and commander-in-chief, and yield him the tribute of our unfeigned admiration.

"And do these bees know their master?" was the inquiry which then invariably arose, accompanied by the spontaneous response—"Undoubtedly! The bees cannot fail to know their keeper. Are they not known to be so attached and true, that when their owner dies they too pine away and perish?"

These views and notions are probably those which most men, not having occasion to revise them subsequently and ascertain the truth, carry with them from boyhood to maturer years. Spring flowers in garden and meadow, the sweet odor of honey, bright sunshine, summer showers, the hum of the hive, honey-cakes and mead, a dim conception of the mysteries of the household and of the wise orderings of nature; but, above all, the memory of swollen noses, closed eyes, and rubicund ears—in short, a commingling of undefined admiration and secret apprehension or dread; such, approximately at least, are the views and feelings which loom up before the fancy or cower in the heart of the layman when the talk is of bees. And even in the bee-garden, in the very presence of the "toiling multitude," the remark is frequently made—"Is it not so, the bees know their owner?"

I would, therefore, in advance, beg pardon of all sentimental folks, for now undertaking to attack and demolish this venerable, though poetic conceit—denying that the bees cherish any such attachments or possess such regard; and responding to the remark with a blunt, bluff, prosaic no! Nor need I say that this response is intended for the layman only and the novice, for the experienced and observant bee-keeper would not put the question, having long since settled the point to his own satisfaction.

In arranging my reply, I shall make short work with the queen and the drones—eliminating and excluding them altogether from the discussion.

As regards the drones, they are either lounging wistfully around the honey-pots at home, or roaming abroad for exercise, or in the pursuit of enjoyment at the forfeit of life. They confessedly have no fondness for the bee-keeper, nor the bee-keeper for them.

The queen, on her part, dwells in the interior of the hive, on household cares intent. If ever she leaves home, it is to accompany a swarm—thus mischievously bent on deserting her owner; or, impelled by blind passion, she rushes forth in quest of a mate—on which important occasion, she has, of course, no consideration whatever for the solicitous attention of her master.

Two of the constituents of the hive thus summarily disposed of, as not coming in any respect within the province of the "main question," the workers alone remain to have their case investigated.

Now the worker is a remarkably self-occupied creature, intent on specific duties, and devoted when from home to certain definite labors. She works with an assiduous perseverance and fatalistic contempt of danger and death, as though sworn to the unflagging discharge of her obligations even unto the bitter end. She waits upon the queen, she renders watch and ward, she measures the minutest angles, and builds most wondrous polygons. She constructs admirable queen cradles for incipient royalty, concocts the needed pap and pabulum for the infant brood, ventilates the chamber, sweeps the floor, carries out the dross, and buries the dead. These are her domestic labors—her supervision of the department of the interior. But she has charge likewise of the portfolio of foreign relations. Behold her on some sunny morn, making her appearance at the door of her domicile, brushing the dust from her eyes, drawing on her gloves, and dashing off boldly in mid air, winging her zig-zag and circumforaneous flight to the yellow rape-field, the

sweet smelling linden grove, or the distant heathery hills. Returning thence on rapid wing, in a "bee-line," she comes laden with distended honey-bag and well-filled breadbasket, these to be discharged into the common hoard, and garnered in the cellular repositories prepared with such artistic skill for their reception. And this continues, with scarce an intermission, from early dawn to dusky eve; though this incessant activity in most instances, leads to a premature death. Her wings become ragged and worn; her muscles relax; swallows, hornets and spiders way-lay and entrap her; sudden storms and gusts of rain dash her to the earth; and the deceitful mirror of brook and pond tempts her to a watery grave. Hence the bee, as Dzierzon has proved, in spring and summer, hardly gets to be six weeks old. To the bee in winter, there can be no reference here, as she, withdrawn from all out-door labor, hybernates, or rather simply vegetates in quiet retirement and domestic repose. Where then would the active, untiring bee find time to bestow special regard to and nurse recognition and attachment for her owner, though he were a bee-keeper as respectable and venerable as the ancient Aristæus himself.

Undoubtedly those workers, whose particular charge it is for the time to mount guard at the entrance of the hive, will not fail to take special notice of Mr. Bee-keeper whenever he happens to visit the apiary. But if we may be permitted to regard matters from the standpoint of an insect, and to assume that it, like ourselves, takes its own size as the standard of measure, the respectable gentleman just referred to might appear to the eyes of the bee somewhat like a large, dark, menacing giant, with great fiery eyeballs, and enveloped in a blue mist bedimming the sun. Not a very engaging and lovable object, surely.

On the whole, too, I would ask every honest bee-keeper to declare on his conscience, whether, on such occasions, when the bee approached him with pressing closeness, for recognition, he ever observed on the part of the said bee any evidence of loving attachment or respectful regard, or any demonstration of a desire to cultivate a friendly acquaintance or renew pleasant sociable intercourse, such as the question propounded seems fairly to imply? I suspect he will not answer aye—nor will he utterly repudiate the notion of the blue mist, as an illusion of the imagination.

"Good!" exclaims our inquiring bee friend, "Good! but our excellent bee master surely will not always be standing there as a mere looker-on. He will, at least in the spring, raise up his hives and peep within; or, if he has movable comb hives, will now and then take them apart for examination; will divide stock; will raise queens, and will make artificial colonies—and thus necessarily form and cultivate a closer acquaintance with his bees." All right, my worthy friend, I reply. But, alas, I must confess that in us bee-keepers, at those moments when we undertake actually to handle bees, the coolness and courage which we are wont to make our pride and boast, are apt to ooze out wonderfully, unless we equip ourselves in sting-proof armour. We are quite ready at such times to array ourselves in deep disguise, and then stalk about boldly in impenetrable incognito. With hands encased in thickest woolen mittens, with head ensconced in close-meshed bee-cap, and with loose linen blouse enveloping the body, we move in masquerade, so that neither friend nor brother could identify us—much less our favorite bees, friendly and familiar as they might be disposed to be. Even the boldest operator among us will scarcely disdain, on such occasions, to blow a whiff of tobacco smoke into the nose and eyes of the prying and obtrusive bees, who come quizzically whirring around, striving to peep under his visor, to ascertain whether it is indeed the smiling face of their well-known and much-loved owner that is so well guarded and so sedulously kept from view. Incredible numbers of cigars are annually smoked, in self-defence, by "practical apiarians," while making artificial colonies; and meerschaums and clay pipes, by the groce, are in demand during the season when first and second swarms are to be hived. And since, in the case of tobacco, demand and supply have of late years not kept due pace with each other—the weed having risen in price, while cash has grown scarcer, and the worshipful operator, in his zeal for his own safety, not being always careful to procure the best quality of the needful commodity, it may well be doubted whether the bees feel specially flattered by the flavor of the article used; and it can scarcely be imagined that their sympathies will thereby be enlisted or their favorable regards secured, while the *interesting* work is going on.

But suppose we could honestly and conscientiously concede to the unquestionably ingenious bee, a degree of intelligence enabling her to comprehend, in all its amplitude and extent, the true relation subsisting between herself and her owner, would she not diligently seek to protect herself and her stores from the skillful hands of the accomplished bee-master? What is there in all he does, on the more important occasions, to entitle him to the devoted attachment of his hard-working charge, though he have the vanity to dignify himself with the endearing appellation of bee-father? He looks very complacently all summer on the toil of his favorite, and rejoices to witness the ever-growing accumulation of stores. Then, in autumn, he sneaks off to a drug-shop and buys an ounce of villainous brimstone, and with its suffocating fumes dooms the hapless inmates of his hives to swift destruction. Next, pressing, and seething, and skimming, he separates wax from honey, and hastening to market converts both into cash—exulting over his gains as though the money were the product of his own veritable industry; and there his kindness ends. Now what could a conscious intelligent insect perceive in all this to inspire attachment to her owner, or cause her to rejoice in his presence at the apiary? Are not we bee-keepers the most arrant honey-thieves on earth; and would not the bees justly hail us by that title, could they speak?

Finally, we must not neglect to do justice to

the vulgar notion already referred to, which ascribes inconsolable sorrow to the bees when their owner dies, alleging that they too then pine away and perish from sheer grief at the loss of their venerated friend. Undoubtedly there is a substratum of truth underlying this ancient and world-wide belief, and it would be interesting to gather up and analyze some authentic accounts of such occurrences. We should then, in all likelihood, reach this surprising result, that the cases of mortality—all and singular—were limited to the spring of the year; and that in the obituary of the defunct bee-keepers, their biographer had omitted to mention the fact that they had, each and all, undertaken to winter weak stocks only; had become alarmed by dread of starvatiou as spring approached, and went out to feed their bees, thinly clad, in a raw easterly storm. Taking cold from such imprudent exposure, pneumonia followed, and death supervened. And now, the provident apiarians failing to re-appear with their feeding troughs, the bees speedily succumbed; sickness and famine swept them off by the score, and family after family went the way of their late owners.

"Men have died, and worms have eaten them,
But not from love."

And thus bees have perished, but not from grief for their departed owners.

Hence, according to all this, the well-meant and flatteringly unctious question with which this erudite discussion was opened, must finally be decided in the negative. "The *nays* have it." All the credit which we bee-keepers have so long enjoyed for living on familiar terms with our bees—though these have neither the disposition, nor any valid reason, to cherish attachment for our persons—proves in the end to be founded on sheer knack in management and practical skill in manipulation, together with a sedate and dignified demeanor somewhat imposing from its manner. For truth's sake we are bound to make this acknowledgment, though the wide-spread notion of the fondness of the bees for their master, should thereby receive its *coup-de-grace*.

The true bee-master, be it known, is the genuine Platonic "philosopher on his throne." He declares, with the shrewdest politician of the present day, "the bees must bear in mind that they are the subjects of an absolute government"; and exclaims with Sarastro in the Magic Flute:

"Though I cannot constrain thee to love me,
Yet still will I ne'er set thee free."

MUNICH. W. BUSCH.

[For the American Bee Journal.]

On the 10th and 12th of July, 1866, I put a swarm of black bees in each of two box hives. One of them filled its hive full of comb; the other only two-thirds. During February and March following they both perished. I saved the combs entire in each, and fumigated them with sulphur twice during the spring. On the 20th and 21st of June I put in each hive a swarm of black bees, which were well pleased with their new furnished home. On the 28th of June, I received twenty-four pounds of box honey from the eldest, and on the 5th of July two boxes more of same amount—making forty-eight pounds of honey. The main hive is full of comb filled with honey, and from all appearance I shall have twenty-four pounds more by the 20th of the month—total, seventy-two pounds.

The other hive has done equally well, in proportion to the time and the amount of comb when commencing.

Does this case involve anything new that might be improved upon? Could this year's swarms be driven out late in the fall into breeding hives, and the comb reserved for next season's use? I would like to hear the difficulties in the way of the above suggestions explained by some of the numerous readers of the JOURNAL. By the way, the readers of the BEE JOURNAL are among the most intellectual and moral men of our time, as the culture of the honey bee involves, next to man himself, the greatest wonders of our kind Heavenly Father.

J. L. PEARCE.

MINERAL RIDGE, OHIO.

NORTH READING, (Mass.), July 20.

We have had very poor seasons here for bees for the last two years. Last year there was a very full bloom of the fruit trees; but the weather was unfavorable, and there being only a small amount of clover, new swarms scarcely got enough to live on. I had a number of swarms that did not build their combs more than half way down. These I fed enough to carry them through the winter. But few bees died in this vicinity, except those that were short of honey.

This spring has been cold and wet. The fruit trees did not bloom scarcely any. There was a large quantity of white clover, and the bees have gathered considerable surplus honey. My stocks that only partly filled their hives and had to be fed, have built their combs down, and all of them swarmed, some of them twice and some of them three times.

I have noticed, for several years, that swarms come out late, especially second or third swarms, if fed enough to carry them through the winter, build their combs down the next season, and generally do much better than old stocks.

I think this is rather an unfavorable locality for keeping bees on account of the sudden changes of the weather in the honey season—which generally last only two or three weeks—the bees seldom gathering any surplus, except when white clover is in blossom.

My bees are Italian, but not pure. There are so many black bees in this neighborhood, that it is impossible to keep the Italians pure. I use Clarke's hive generally. Bees winter here much better in the Clarke, or in the old fashioned hive, then they do in moveable-comb hives. The movable combs are indispensable for rearing queens; but, for general use, I prefer the Clarke.

I like the AMERICAN BEE JOURNAL very much, and hope it will meet with such success as to make it a permanent institution.

JOSEPH D. GOWING.

THE AMERICAN BEE JOURNAL.

WASHINGTON, JULY, 1867.

☞ THE AMERICAN BEE JOURNAL is now published monthly, in the City of Washington, (D. C.,) at $2 per annum. All communications should be addressed to the Editor, at that place.

To Subscribers in Canada.

MR. JOHN H. THOMAS, of Brooklin, Canada West, will act as the authorized agent of the AMERICAN BEE JOURNAL in Canada and the British provinces. Remittances to him on our account, will be duly acknowledged.

A New Notion.

The French Academy of Sciences has recently published an article, prepared by Dr. Landois, of Munster, on the "*Law of Sexual Development*," in which an attempt is made to overthrow the Dzierzon theory on that subject in the case of bees. He says: "It is known that the eggs from which workers proceed are laid in cells differing from those in which eggs producing drones are laid; and that the food or jelly with which the bees supply the larvæ is prepared distinctly for each sex. Hence the query readily arose, may not drones be produced from eggs laid in worker cells, if such eggs be transferred to drone cells, and care be taken that the nursing bees shall supply the disclosed larvæ with drone-jelly exclusively? and, conversely, may not workers be produced from drone eggs, under similar circumstances and like treatment?"

Dr. Landois says that he actually made the experiment repeatedy, though at first without success, as the bees defeated his arrangements; but finally he succeeeded in deceiving them, and then the result was in accordance with his anticipations. The attempt, he alleges, will invariably fail, if the transferred eggs be placed in a comb the cells of which contain none laid therein by the queen. His process was to cut out with the point of a knife, a portion of the cell bottom to which the egg is attached by the queen in oviposition; and then, lifting out the small plate with the egg thereon, insert it in the cell designed to receive it. He claims to have produced workers from drone eggs by this process, and drones from worker eggs, and thus demonstrated that the production of workers is not the result of impregnation, and that sexual development is dependent solely and exclusively on nutriment.

All this, we have no doubt will prove to be a mistake. It will be found that Dr. Landois, instead of deceiving the bees, was himself deceived by them. The fact, well ascertained, that there is no difference whatever in the jelly fed to drone or worker larvæ, is fatal to his doctrine, if no other objections could be urged against it.

Errata.

In Prof. Varro's communication on the "Purity of Italian Queens," in our last number, there is an omission after the fifth line from the bottom of the second column, page 19, which should be supplied. The passage ought to read —"he bought three queens from Mr. Langstroth, one of which *produced an almost black Italian queen, which* he tested for breeding," &c.

In the description of Mr. Allen's hive, in the same number, the word *racks* is misprinted *sacks* in the 39th line of the first column, page 18.

Among the mass of amusing and instructive information with which the volumes of Kirby and Spence abound, is the following: Bees in excursions do not confine themselves to the spot immediately contiguous to their dwellings, but, when led by the scent of honey, will go a mile from it, or considerably more; yet from this distance they will discover honey with as much certainty as if it was in their sight. A young bee, as soon as it can use its wings, and has learned by hovering in front of it to know the position of its hive, seems perfectly aware, without any previous instruction, what are to be its duties and employments for the rest of its life. It appears to know that it is born for society, and not for selfish pursuits, and therefore it invariably devotes itself to the benefit of the community to which it belongs. Walking on the combs it seeks for the door of the hive that it may sally forth and be useful. Full of life and activity it then takes its first flight, and, unconducted but by its instincts, visits like the rest the subjects of Flora, absorbs their nectar, covers itself with their ambrosial dust, and returns unembarrassed to its hive.

☞ It has been a common practice for many years, among German bee-keepers, instead of attempting to winter weak colonies, to drive out the bees from all such in the fall, and unite them with their strong stocks, preserving the hives with the combs they contain for spring use, and placing their early swarms in them. New, clean combs are too valuable to be melted down, unless the present market price of wax were at least quadrupled. When the hives from which the bees were expelled contain honey in the combs, they are occasionally used in the winter or spring to save famishing colonies. Such hives are called "*honicher*" by the Germans—a term for which we have no corresponding English word.—[ED.

INTERESTING CORRESPONDENCE.

BRANDYWINE HUNDRED, (DEL.,) June 15.

Please continue my bee papers, the subscription to which ended with the June number. I like the BEE JOURNAL very much. I have a few hives of bees, and the paper makes them more interesting. I have received the papers regularly. GEORGE W. HARRIET.

LEWISBURG, (W. VA..) June 25.

Being so well pleased with the second volume of your BEE JOURNAL, I cannot do without it; so enclosed find two dollars subscription to the third volume, with many wishes for the success of your enterprise.

T. L. SYDENSTRICKER.

PARMA, (N. Y.,) June 23.

Please send me the AMERICAN BEE JOURNAL another year. I cannot get along without your valuable paper. NELSON TENNY.

PLEASANT HILL, (KY.,) July 4.

I very much hope the AMERICAN BEE JOURNAL may receive patronage enough to sustain it in full vigor and health, as I look upon it as a very valuable publication.

R. B. DUNLAVY.

NEW PARIS, (OHIO,) July 5.

I have been reading the AMERICAN BEE JOURNAL for some time with a great deal of interest, and I think with some profit. I am very anxious to have the publication of it continued.

D. L. KIRKPATRICK.

WEST MIDDLEBURG, (OHIO,) July 8.

I have received the AMERICAN BEE JOURNAL, and found it to be the paper that every man who keeps a colony of bees ought to have.

STOKES HELLING.

HOOSICK CORNERS, (N. Y.,) July 10.

I am much pleased with your BEE JOURNAL, and intend to preserve it bound.

DOTY BRIMMER.

CANFIELD, (OHIO,) July 12.

I hope you will be able to continue to publish the BEE JOURNAL for many years. I find in it many things interesting, and valuable instructions to bee-keepers. I have tried one hint in the cottage management of bees that succeeds very well—namely, placing the swarm on the old stand, and setting the old hive in a new place. I have tried it in about ten cases, and have not been troubled with a second swarm, though two of the new swarms have each swarmed—one in twenty-one days and the other in eighteen days. They are Italians, and I put them in hives containing combs saved from stocks that died in the winter. Both of them stored honey in boxes before swarming; and the old hives that were moved are working in boxes now. My first Italian swarm came June 5. The first common swarm I heard of was about eighteen days later. I have Italianized some hives by giving them a sealed queen cell this season. J. WINFIELD.

EAST SAGINAW, (MICH.,) July 15.

I hope bee-keepers will take interest enough in the JOURNAL to keep it going. There may be some who are too old to learn, but old men pass away and the young must learn. So, success to the BEE JOURNAL.

L. C. WHITING.

RIPON, (WIS.,) July 10.

I wish I could see the BEE JOURNAL well supported by bee-keepers. It is devoted to our work, and the support must come from us. If it go to the wall, see that it is not our fault.

My bees are very much behind in their swarming—out of eighty stocks only four have cast swarms. In the boxes they are doing well. Clover is in full bloom, and has been for over a month, Bass wood will not be in bloom for a week yet. I am testing the work of the Italians this summer, and will compare it with that of the black stocks in the same condition, and give you the result at the close of the season.

R. DART.

MALVERN, (OHIO,) July 18.

Bees have been doing well with us this season, but there will be more swarms, I fear, than honey to feed them, among those who have let their colonies swarm at will.

GEORGE HARDESTY.

For the American Bee Journal.

Transferring.

My first effort in this line was ludicrous enough. I had Quinby's and Kidder's books, and the collection of ropes, and sheets, and boxes, hives, &c., was enough to frighten the bees into good behavior if nothing more. My plan now is to smoke the swarm to be transferred pretty thoroughly. Then turn the hive over, pry off one side, and, with a long knife, cut out the first comb; carefully brush the bees off into the hive from which you are taking the combs. They will continue to move back among the combs as these are removed. Lay your brood combs on a folded cloth, and cut them to fit your frames. Fasten them therein, as directed by Quinby, with sticks, and put the frames into the new hive. You can now brush the bees into the new hive as you remove the combs, and when the combs are all removed, your bees are removed also, and you have no further trouble. It is very rarely the case that you have good straight combs from the old hive to fill all the frames in the new one; so I always use a division board, by which I confine the bees to the space which they really occupy. As they increase in numbers the division board can be moved along, and new frames inserted. By the way, I think too much importance cannot be placed upon the use of the division board. It is invaluable for the use of stocks. Spring is the best time to transfer. If carefully done you need no protection for hands or face.

INTRODUCING QUEENS.

I have changed the Italian queen I have three times this season—done it by the method of Mr. Alley, by smoking. I had good success each time, and should not hesitate to introduce any queen, however costly, in this way.

ITALIANIZING.

Most writers say, remove the old queen six to twelve hours before inserting a sealed queen cell. I have uniformly inserted the queen cell at the same time that I removed the queen, and have not had a cell destroyed.

STRAIGHT COMBS.

I have no infallible rule. But bees build new combs in a parallel line with adjoining combs. An empty frame placed between two straight ones, would inevitably be filled with straight comb, if the bees did not make the full combs adjoining the empty frame thicker, especially near the top; or they will make one much thicker than the other, and thus cause the new comb to be made on one side of the empty frame instead of the centre. I have remedied this in a great measure in my hives by taking out the full frames, and, after brushing off the bees, cutting the honey cells off with a long knife to even thickness with the top of the frame, *i. e.*, $\frac{1}{4}$ of an inch. By cutting over a pail or pan you can save much very nice honey; and before the bees can make the combs thicker again, the new frame will be filled with perfectly straight brood comb. I do not advise any one to do so. It is only this season that I have done this. Perhaps late in the season it might not answer as well. I have seen no bad results as yet, but, on the contrary, I think I can show as many perfect combs to the hive as most bee-keepers.

DRONE COMB.

Can any one tell me the reason of my bees this year building so much drone comb? In nearly all of my hives, whether they have laying queens or not, the bees seem determined to build drone comb. If they begin at the top with worker comb they will change to drone comb at a distance of from two to four inches down; or will build worker comb at one end of the frame and drone comb at the other. I have practiced cutting the drone comb out, but I think this retards comb building very materially. Has any one a reason, or a better remedy?

J. TOMLINSON.

NEWBURG, (WIS.,) July 17, 1867.

The Bee-Eater.

MEROPS APIASTER.

There are many species of the genus *Merops*, all of which are distinguished by their brilliant plumage, and take their prey, consisting of bees, wasps, gnats, &c., on the wing, like the swallow, and what seems remarkable, without being stung by them. The one we are about to describe is among the most elegant of European birds, and next to the Robin and Kingbird may be considered as the most brilliant in point of color. It is a native of the warmer parts of Europe, particularly among the islands of the Grecian Archipelago, and of many parts of both Asia and Africa; but in the north of Europe it is rarely seen. In shape this bird resembles the halcyon tribe, and is about the size of a blackbird. The bill is slightly curved, sharp-pointed, rather long, and black; the irides bright red; the crown of the head and the upper parts of the neck are of an orange-chestnut color; the throat yellow, the scapulars, lower part of the back, and wing-coverts pale yellow, more or less shaded with an admixture of red and green. The smaller quill feathers are rufous-chestnut tipped with green; the larger sea-green with dusky tips; the rump and tail are sea-green, the latter about three inches long, the two middle feathers projecting, in a pointed form, to some distance beyond the rest. The sides of the head, above the eyes, and the whole under parts are sea-green; from the corners of the bill, on each side of the head, a black streak passes across the eyes, curving downwards, and nearly meeting the tips of a black crescent placed across the snout, and separating the yellow of that part from the sea-green of the under parts. The legs are short, and of a reddish brown color. It builds in deep holes on the banks of rivers, forming a nest of moss, and laying from five to seven white eggs.

The Indian Bee-eater (*Merops viridis*) is about half the size of the European species, but the middle tail-feathers are considerably longer. On the upper part of the breast is a crescent-shaped transverse mark, with the horns pointing upwards; the back and lesser covert-feathers of the wings are of a parrot-green color; the rump or coverts of the tail of a bluish-green; the breast and belly of a light green, and the tail is green. The greater quills of the wings are dusky at their tips; the centre quills are of an orange color, bordered with green and marked with black spots, the extreme tips being orange; the first row of coverts above the quills is orange in the centre and green on the edges. The bill is long and sharp-pointed, having a downward incurvation; the claws are pretty strong, and the legs and feet of a dusky brown color. This species is a native of Bengal, parts of Madagascar, &c.

For the American Bee Journal.

MR. EDITOR: I usually double second swarms, saving a few bees with one of the queens, to make good losses. I find that bees from caps carried into the cellar will join these small swarms peaceably, and remain when carried out next day. This would be a safe way, for a novice, to furnish an Italian queen with bees.

Swarms losing their queen will run into other swarms of two or three days standing; but on putting bees of a second swarm into a second swarm of the day previous, they were stung. Swarms of the same day mixing show some fight. What makes the difference? Must they come showing their conscious queenlessness to insure a kind reception?

I have ninety old stands and one hundred new ones. F. H. MINER.

LEMONT, ILLINOIS.